

DRAFT

What's the next Big Initiative?

A thought piece by Sam Armstrong

The keynote speaker for Science Day 2000 at the Capitol hosted by the Science Coalition was Alfred. R Berkeley, III, the President of NASDAQ. Previous speakers had expressed the concern that the United States lead in Science and Technology was rapidly eroding and something should be done about that trend. Mr. Berkeley began by saying that from his vantage point at NASDAQ this was indeed true because his market is the most volatile of its kind and therefore the first to notice trends.

He said that our economic growth had been gradual but constant over the last few decades and that he credited that to our excellence in education and its derivatives of Science and Technology. From his study of economic history he could cite two governmental initiatives that were most responsible for that economic growth. The first was the creation of Land Grant Colleges and Universities in 1862 which enabled many more Americans to get an education. The second initiative was the G.I Bill of 1944. This Bill provided the means for the multitude of returning veterans to get an education rather than flood the existing job market. Then he said: "What we need now is another government initiative. And we should think **Big**."

The original Land Grant legislation was intended to create an environment in higher education that appreciated the study of agriculture and mechanics as opposed to the European model of studying the classics. The private universities in this country at that time were pretty much consistent with the European model. The Bill had been discussed earlier but there had been a great deal of opposition—especially from the South. In 1862, the Bill passed and President Lincoln signed it into law.

Speaking at the Massachusetts Agricultural College in 1887, 25 years after passage of the Act, Senator Morrill, the originator of the Act again set forth his views on the general purpose of the Morrill Act in the following words:

"The land-grant colleges were founded on the idea that a higher and broader education should be placed in every State within the reach of those whose destiny assigns them to, or who may have the courage to choose industrial locations where the wealth of nations is produced; where advanced civilization unfolds its comforts, and where a much larger number of the people need wider educational advantages, and impatiently await their possession . . . It would be a mistake to suppose it was intended that every student should become either a farmer or a mechanic when the design comprehended not only instruction for those who may hold the plow or follow a trade, but such instruction as any person might need—with "the world all before them where to choose"—and without the exclusion of those who might prefer to adhere to the classics."

Land Grant has proven the wisdom of Senator Morrill. It has grown in membership over the years to reach the current number of 214 institutions. The addition of the HBCU's in the 30's and the Tribal Colleges in the last decade have been the big contributors to that growth. It has been a great assistance to the agriculture community through various means including the state Extension Services. It has also been the role model for the creation of Sea Grant and, a dozen years ago, of Space Grant.

Mr. Berkeley's listing of the G. I. Bill as the second initiative was probably no surprise to the majority of the audience many of whom surely knew someone who had benefited from that program. At the height of the program in 1947, 49% of college students were under the G. I. Bill. The Bill terminated for WW II veterans in 1956 but there were subsequent bills that acknowledged and supported Korean and Vietnam War veterans. It has been generally accepted that all of these veterans were good risks for higher education because of their maturity and thus a good Federal investment.

There was subsequent Federal involvement that Mr. Berkeley didn't mention but seems to me to be instructive for the current situation. Shortly after we were startled and

scared as a result of the Soviets orbiting of Sputnik, two acts were passed in 1958. NASA was created and the National Defense Education Act of 1958 was passed. The nation realized that it was in extremis and broke the stalemate associated with States' Rights for higher education. It provided fellowships for certain critical areas of study. The first year it specified 1,000 fellowships to be raised to 1,500 through 1962. There are still people around who were products of that Act and are willing to give testimonials.

All of the three initiatives discussed above were products of the Federal Government. Noteworthy also is that the participation at the Federal level involved more than our Department of Education (The department did not exist even in 1958 although there was a role for the Commissioner of Education). The now USDA was very instrumental in Land Grant and continues to still be involved. Likewise the now VA was very much involved with the G. I. Bill. NASA and the Department of Defense and other agencies with Science and Engineering requirements were instrumental in determining what skills needed to be emphasized under the Defense Education Act. **My bottom line:** The Federal Government has had an important role in the field of education over the years. It is the responsibility of many elements within the Federal Government. And the Federal Government should take a leadership role in responding to Mr. Berkeley's challenge to come up with the next **Big** initiative.

I've personally devoted a lot of time and study to the issue of the United States S&E work force. I've pursued this issue through the Government University Industry Roundtable (GUIRR) and other associations/organizations which have similar concerns. The National Science Board's Science and Engineering Indicator, 2002 paint even a darker picture than its 2000 edition. Taken together, the various indicators are a real cause for alarm and a call to action. There are some who want more data before committing to action but most agree that the risk is too high not to act on the concerns as we currently know them.

You would be perfectly proper to ask me at this point what I am proposing for the next **Big** initiative. There is no one single initiative that could warrant the title **Big**. In fact, I've said publicly that there is not even an adequate family of identifiable, specific solutions. Instead, we have a collage of efforts that might hold the ultimate solution. They are a collage because one would have to look closely to discern all of the efforts that are now in force and shine the light on those that have the biggest payoff and need to be increased. One of the problems is that neither one person or organization could identify everything that should be part of the collage.

Like the initiatives listed by Mr. Berkeley, we now should be responding to a **National** issue. Lack of S&E talent (leaving aside the life sciences for the moment) in any of the sectors of our economy becomes a national issue. For example, it doesn't do NASA any good to have sufficient talent if the contractors who make the vehicles are not so well staffed. The same goes to the national issue if Academe doesn't have the professors to pass on the knowledge in certain critical areas to the next generations. That's why I concentrated my efforts to work with the GUIRR since that represents all of the elements of the economy.

Last October there was a meeting of the GUIRR, which concentrated on one issue—the S&E work force of the future. I had the privilege of co-chairing that particular session with Dr. Shirley Jackson, the president of R.P.I. There was a consensus that we do indeed have an emerging problem—close to a crisis as the 2001 Hart-Rudman Report asserts. We also agreed that this would have a negative impact on many areas of the economy but could not quantify specific consequences. Finally, we agreed that we needed to look for ways to mitigate the risk. It would be up to individual members, solely or in a group, to pursue the mitigation possibilities with the GUIRR acting as a committee of the whole as a steering group.

In the beginning of 2002, I took the initiative to call together a number of GUIRR members to form a group which I entitled: "The Coalition of the Concerned over the S&E Work Force". The group is composed mainly of representatives of the R&D

agencies but there were two industry executives and one professor who also joined this semi-formal group. So far we have had three face-to-face meetings and two telecons. The initial emphasis was placed on the area where we thought we could have the most immediate impact—reducing the dropout rate of science and engineering majors during their undergraduate education.

It was obvious at the start that all of us had some programs underway but that they were unknown to the rest. So we each submitted two page summaries of two of our programs with at least one dealing with the undergraduate dropout issue. We are in the process of placing these and all of our educational programs on a web site with links to our home pages.

In the meantime, we have talked with others who have similar concerns and programs of mitigation. These include Project Kaleidoscope, the Sloan Foundation, National Bureau of Economic Research and Partnership for Public Service. I have personally participated with the Commission on the Future of the United States Aerospace Industry on the subject of human capital. I've also participated on Roundtable number three (University R&D) hosted by the Technology Administration of the Department of Commerce. I'm confident that more will be added to our group as we proceed down this long road. The objective is to: "Get everybody generally headed west." We've talked about ways to evaluate our education programs so as to identify those elements in the collage that should be highlighted.

I'm not embarrassed that this is only a "work in progress." At least there is some work. As Dean Kamen said at the March GUIRR meeting: "After all was said and done, all was said and nothing was done". Politicians like to say: "as we move forward..." As a nation we do need to move forward but we need to agree on the general direction—if not west. The Coalition is soliciting ideas, participation and commitment so we'll have a composite answer to Mr. Berkeley's challenge.